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12 August 1960

Dear Dick:

PROGRESS REPORT #11

I am sorry to be two weeks late with this progress report, but I am sure you know the reason for the delay. During the period from 1 July to the present, the following has developed.

1. [redacted]

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[redacted]

2. ENGINEERING

The status of the engineering on the aircraft appears to be excellent. We have passed the release of the 1,000th drawing to the shop and are far in advance of the manufacturing group. The engineering personnel are at a stable level of approximately [redacted] people. 25X1A

3. MANUFACTURING

Our major difficulty in the program is associated with the lack of titanium material to build parts. Our new processes for cleaning, hot forming and etching appear to be working well, and we now appear to be getting good and reliable parts. The area of difficulty lies in getting bar stock, extrusions, but particularly heavy formed billet, to put into the machine shop. All machined parts for the 25-foot fuselage section have been completed, but the elements required for the test nacelle, static test wing, and the heavier sections of the aircraft, including the landing gear, are not available. We 25X1A asked [redacted] to make tool tries on the dies for the landing gear with 4130 steel. This has resulted in our receiving, for a cost of about $1,000, two sets of landing gear forgings in steel, which we are keeping available for emergency, should we have difficulty in getting the proper characteristics in titanium. We would have received one set of landing gear forgings at this time, had not [redacted] 25X1A 25X1A [redacted] made a major mistake in heating the material to 2200° prior to forming, and completely ruining the properties. We have this set of rough parts here, also, and they will be used for training purposes at our landing gear vendor's, at no cost to us.

Delivery dates of major aircraft components have now been established as per the attached letter.

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[redacted]

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[redacted] It was necessary to send an engineer and one of our shop supervision to TMC, where they spent two weeks chasing down every order we had placed. By reviewing the test data on the scene, and noting what discrepancies existed in allowable strengths but, more particularly, in elongation, it has been possible to clear a number of major parts, which are in shipment.

25X1A The general period of delay, from the original dates specified by TMC and [redacted] runs from 2 to 6 months. The impact of the lack of these major material elements has not yet been evaluated in regard to the flight schedule, as a great deal of work is involved in doing this. This work is in process, however, and we are making every effort to make up some of this time, by the use of overtime and extremely close follow-up procedures.

25X1D [redacted]

25X1D [redacted] We have had constant contact with the managements of all three companies involved in our titanium program, and they have been very cooperative in all cases. We were not able to break this bottleneck, however, until we had our people actually trace every part on our orders through their shops and

25X1D until we accepted [redacted]

25X1D [redacted]

Our tooling situation is in hand. It was necessary to take rather

25X1A desperate measures in training bench machinists as tool makers for the many form blocks required. This procedure was very successful, and we currently have no important requirements for added tooling people. Over [redacted] people are engaged in tooling the airplane.

25X1D [redacted]

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[redacted]

4. PERSONNEL

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As of today, [redacted] people are at work on the A-12 program. This is below our expected input by [redacted] people, reflecting directly the material trouble.

5. AERODYNAMICS

Some very gratifying tests have been concluded on the flight simulator at Ames, using not only our own pilots but also [redacted] 25X1A It was necessary to make a large number of changes and improvements on the NASA machine, but we obtained excellent reassurance on the aircraft flight characteristics. It was not possible to simulate the lateral and directional characteristics along with the longitudinal ones, but we are planning on going back shortly and doing the lateral directional characteristics, including the major longitudinal ones. The airplane was flown throughout its speed range, under many different conditions. In all cases, we simulated the adverse center of gravity positions and various weights, and also put into the program high velocity gusts, power failures, etc. The major conclusions drawn to this date from the simulator tests agree very well with our predicted aerodynamic data and, in general, because of the large size of the airplane, the periods are long enough so that it can be flown in some quite unstable regions without the use of stability dampers.

a. The use of 28% rearward c.g. is acceptable for all flight conditions, including landing, without the use of stability augmentors, but it is difficult to fly.

b. A full mission was flown without the use of stability augmentors and, while the pilot had to work hard, a safe flight could be made, even when he was subjected to vertical gust velocities of 50 feet per second.

c. The aircraft with the basic stability augmentors flies well. In the refueling region, it does not have sufficient speed stability.

d. By adding a "Mach box" to our existing control system, the characteristics of the aircraft are good in all regimes and, in fact, the airplane appears to fly better than the F-100, but not as well as the F-104.

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e. Rigid control specifications must be set up to keep the elevator breakout forces to 5 pounds or less. This will be a chore, because the problems of using high temperature bearings and 100-foot cable runs are difficult. I am attaching a copy of [redacted] summary on his flight in the simulator. We are preparing to extend this program into a flight program using an NASA F-100 aircraft, for which we will provide variable stability inputs, as we did with the Grumman airplane, to establish the cathedral on the F-104. 25X1A

6. POWER PLANT

We are having difficulty in tying down the ejector design conditions with their attendant thrust and drag values, while the use of the new shock trap can reduce the bleed air requirement to about one-half of the original value and still give us the same ram. We now find that P&W unofficially will require more cooling air than we had proposed to give them. We are in a rather unsettled region, where, as we make improvements in our over-all airflow conditions, we just seem to be staying even with new requirements and changes in thrust output reported to us by the engine manufacturer. I expect that we will be called upon to furnish more than 4% of the engine airflow for cooling, and that this will force us to the use of the shock trap bleed, which will add weight over the original configuration. We have carried along the design of both the original porous type bleed with louvers and the shock trap bleed, so that we will be in a position to go either way within the next month. From a schedule point of view, it is necessary to finalize the inlet conditions, from all angles, by 15 September.

7. SAFETY

At our request, the Air Force provided us with complete studies of the B-58 accidents to date. These have been reviewed, to make sure that we are not incorporating design features in the A-12 which might lead to accidents. I will discuss the results of this study at the next suppliers' meeting. I do not believe that the three major causes of the B-58 accidents will be a factor with the A-12. These have been the very small tire diameter and multiplicity of tires, complex automatic fuel controls, and difficulties with a very complicated control system. [redacted] have made elements of the B-58 system, and we are aware of the difficulties with their ratio shifters and similar devices. I think we have avoided those particular problems, but I do not pretend that there are not major safety problems which require constant study and attention to obtain satisfactory results. 25X1A

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3. **FACILITY STUDY FOR** [redacted]

On 28-29 July, a large group assembled to study the requirements for facilities at [redacted] LAC had made a complete evaluation of the equipment and other requirements. This was presented as a basis for discussion, and copies of the report were turned over to Mr. Parangosky. I believe another meeting on the same subject will be called in the near future. Certain assignments were given us to prepare, and we are to coordinate information from other vendors to fill out our study. These assignments are being undertaken. 25X1A

Kelly

cc: E.K.
J.P.
Encls.

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